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caption. The omission of any discussion of even the simplest types of simultaneous quadratics is unfortunate in a text explicitly designed for "the student who will continue his mathematics as far as the calculus." In analytic geometry simultaneous quadratics occur as frequently as any topic of algebra. The extension of Horner's method to the computation of larger roots by approximating first to hundreds, then tens, then units, is desirable. No hint of this is given in the text nor is any problem presented which suggests this extension.

Only one historical note is found in the text and that involves a disputed point. Tartaglia arrived at the solution of the cubic before Cardan, as the latter stated in his published work. However Scipio Ferro (died 1526), also cited by Cardan, was prior to both in the solution of the cubic of the form, $x^3 + ax = b$.

L. C. KARPINSKI.

PROBLEMS AND QUESTIONS.

B. F. FINKEL, CHAIRMAN OF THE COMMITTEE.

PROBLEMS FOR SOLUTION.

ALGEBRA.

388. Proposed by JOSEPH V. COLLINS, Stevens Point, Wis.

On a certain typewriter there is a double scale as follows:

80........70........60........50........40........30........20........10........ 0
1 .... 5........10........15........20........25........30........35........40

It is used to locate headings in the middle of the page. To space a heading one sets the machine at the right stop and with the spacer counts out the number of letters and spaces in the heading. To the reading on the 40 scale where the carriage stops is added the reading of the right stop on the same scale. This number is the one on which to set the carriage pointer on the 80 scale to begin the heading. Show by algebra that the method is correct.

389. Proposed by W. W. BEMAN, Univ. of Michigan.

If $e^{e^x} = 1 + a_1x + a_2x^2 + a_3x^3 \cdots$, prove that

$$na_n = \Sigma_{k=1}^{k=n} \frac{1}{(k-1)!} a_{n-k}, \qquad \text{or} \qquad n!\,a_n = \Sigma_{k=1}^{k=n} \frac{(n-1)!}{(k-1)!} a_{n-k},$$

which latter form lends itself more readily to computation.

390. Proposed by E. B. ESCOTT, University of Michigan.

Sum the series,

$$\tfrac{1}{1} + \tfrac{1}{2} + \tfrac{2}{4} + \tfrac{3}{8} + \tfrac{5}{16} + \tfrac{8}{32} + \cdots,$$

where each numerator is the sum of the two preceding and the denominators are in geometrical progression.

391. Proposed by C. N. SCHMALL, New York, N. Y.

Show that the roots of the quadratic

$$ax^2 + 2bx + c = 0$$

are imaginary if a, b, c, are in harmonic progression and have the same sign.

GEOMETRY.

417. Proposed by R. P. BAKER, University of Iowa.

Enumerate the points in which the twelve dihedral bisector planes of a tetrahedron meet, find their multiplicity and account for the 220 points which 12 planes in general determine.